M. Rieffel   Math 128A   October 13, 1998
                           First Midterm Exam

SHOW YOUR WORK COMPLETELY AND NEATLY.   Total points = 60.

3   1. a) State the simple trapezoid rule for numerical integration, and indicate
               very briefly its geometrical meaning.

3   b) From part a) derive the composite trapezoid rule.

3   c) Determine the highest degree of polynomials for which the trapezoid
               rule is exact

7   d) Derive the truncation error formula for the simple trapezoid rule.

4   e) Derive from d) the truncation error formula for the composite rule.

5   f) Give a precise discussion of the effect of round-off error when the
               composite trapezoid rule is used for numerical integration.

3   2. a) For distinct centers c_j and values f_j define what is
               meant by $f[c_0 , \dots , c_n]$.

11   b) Give a careful proof of the formula
               $f[c_0 , \dots , c_n] = (f[c_1 , \dots , c_n] - f[c_0 , \dots , c_{n-1}])/(c_n - c_0)$.

11   3. Find the Newton form of the polynomial which Hermite interpolates the
             function $f(x) = |x|$ at the points $1, 1, -1, -1$.

10   4. Give a brief but precise explanation (including geometry) of how one
             obtains the formula for Newton's method for finding the zeros of a
             function. (Include a statement of the formula.)